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**Paper dispenser**

This invention concerns a paper dispenser for the dispensing of paper in the sanitary field.

In for instance toilet rooms, or perhaps one should say rooms provided with a toilet it is in addition to toilet paper also necessary with facilities for washing and drying. This is also the case with more or less public conveniences,

The arranging of washing facilities in toilet rooms as well as other places is to a large extent a question of cleanliness, that is in reality a larger or lesser degree of sterile condition is the aim or at least that the possibilities for bacteria growth are reduced or eliminated.

In view of the above problem the object of the invention is to provide a dispensing device for dispensing of moistened paper that fulfil high hygienic demands.

The above object is in accordance with invention solved with a dispenser for washing paper that includes a spraying device for the adding of liquid to the paper after it has been feed out from the dispenser. In this way one can ascertain that all liquid ends up on the paper and only there. In this way the dispenser is kept entirely dry and hygienic. Advantageously the spraying is controlled so that it starts first when the first edge of the paper has passed the nozzles and is ended before the final edge of the intended piece of paper has reached the nozzles. In other word the following paper is not sprayd until it is to be used.

Advantageously a continuous paper web is used that is perforated in connection with the dispensing. Advantageously the dispensing of the paper takes place downwards so that the paper can hang freely during the spraying.

The dispensing is preferably motor driven.

The device is controlled, for instance with a small computer so that moist as well non-moist paper can be dispensed and one can also consider to choose among water, spirit or water with soap etc at each dispensing occasion.

In connection with toilet rooms and several other places space efficient dispensing devices for paper are wanted, which is contrary to the desired long service intervals and there by large toilet paper rolls and hand drying devices of different kinds. The large toilet rolls are intended to enable longer time of use between the change of rolls but result due to their great weight often in the paper being torn in the wrong place or being generally difficult to pull out at all. Furthermore the rolls must frequently be changed a fair time before they are actually entirely used since it is impossible to adjust the service occasion to when the roll is entirely used up. Drying towels with their dispensing device and basket for the collection or other verities also take comparably much space and in the case with loose

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towels the result is also often that the towels end up on the floor, which looks less pleasant and give the service personal more work.

The invention therefore has as its object to reduce or eliminate the above space problems and achieve an efficient device for the providing of paper and in particular with different use, for instant toilet paper as well as washing and drying paper and in particular for use in connection with toilets..

In accordance with the invention this object is solved by means of a device, the depth of which, that is the distance that is required out from a wall on which the device is suspended, is only slightly greater than the width of toilet paper. Advantageously the device is electrically motor driven and is for instance controlled via a contact free switch, for instance photo detector, movement detector etc. Furthermore the device preferably includes means for a moistening of the paper when needed.

When the torn paper is to be used as toilet paper this is dispensed dry while when intended to be used as hand wash paper it is moistened, possibly with the adding of suitable cleaning and/or disinfective agents.

By choosing a paper quality that is dissolvable in water, similar to that in normal toilet paper, but with slightly longer dissolving time, the same paper can be used as toilet paper as well as washing and drying paper. In this way it is possible to make do with only one paper supply from which feeding take place, and which is an essential step forward, all papers can (independent of use) be flushed down in the toilet. In this way the need of a collection basket is eliminated, as well as the accompanying work for the service personnel and at the same time improved possibilities is obtained for keeping the toilet room at all times looking fresh and unused. Likewise the need of wash basin is eliminated or reduced.

In accordance with a further development of the invention the paper supply is constituted by a folded paper web that is drawn upwards from a corresponding cardboard box or loadable cassette. In this the paper weight that has to be put in motion at each paper dispensing is small and comparatively constant during all the time that paper can be taken from the supply.

The paper may in a known manner be torn by hand, but in an advantageous embodiment the cutting or perforating of the paper may be mechanised in order to achieve a good and of the skill of respective users completely independent function. At this one can consider that the paper is only partly cut so that the paper that is to be used remains hanging but that the force that has to be used at the taking becomes small. For instance the paper can be left fastened or suspended at one or both of its edges.

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Advantageously the invented machine may have place for several bundles of paper were the papers in the bundles are joined to each other. The paper in the lower end of an upper bundle is joined to the upper end of paper of the proximate bundle below. The joining can be achieved in different ways, for instance by means of a suitable water solvable (slowly) glue.

- 5 This glue may be applied in advance on one or both of the ends of the bundles and covered by a waxed paper that is removed at the joining alternatively the joining may take place by half way punching tongues of paper gripping each other, for instance by means of a special simple tool that only need to be squeezed over the two paper ends. The tool may either be on place in each paper-providing device in accordance with invention or be brought along by  
10 the service personel. One can also consider other types of joints and joining means.

The wetting of the paper advantageously is achieved with different nozzles for the adding of only water or water with an additive of soap or other disinfecting substances or perfume.

- Depending on available space and desired choices the dispensing device according to the invention can also be designed with a supply in the shape of a paper roll that possibly may  
15 have the shape of a more or less common household paper roll. One could also consider to arrange it at the bottom inside an upper cupboard in a kitchen for the dispensing of dry paper only or as has been described above with or without the adding of a wetting liquid. Such a home version of the invention is also possible to consider with varying orientation for the feeding, for instance for nursery rooms.

- 20 In particular for a simpler home version one can instead of having a connection to the water distribution net consider having a particular or particular fillable containers and possible low voltage connection. In this way the device can also be used on busses, train, boats etc.

- Further characteristics of advantageous further development of the invention and  
25 advantages with this are apparent from the appended patent claims and the following description of an advantageous embodiment of invention with references to the appended drawings. At this Fig. 1 shows a device with a dispensing of paper in accordance with invention as a unit Fig. 2 the same device as in Fig. 1 with removed cover, Fig. 3 and 4 a feeding and perforating unit in the device, Fig. 5 the connection for soap and chemical  
30 containers and Fig. 6 schematically a machine for the folding of the paper.

The dispensing device for paper shown in the drawings include a rear frame or plate intended to be fastened on a wall and referenced with 1. On the frame a removable paper cassette 2 is arranged. Below the cassette there is an integrated feed and perforating device 3 for the paper. At the side of the cassette containers for soap 5 and disinfecting agent 4 are

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arranged as well as dosage pumps and valves for this and for water and furthermore net unit, battery and control unit. For the sake of clarity the present wire laying has been omitted, the electric, as well as that of water, soap and desinfective agent etc.

5 The paper cassette 2 has the shape of a vertical shaft that at the bottom is ended by a bottom 6. The shaft is entirely open forwards in its bottom end and in the upper end provided with a slot 7 extending over the entire remaining height. In the shaft is further arranged a shelf 8 that is journaled or attachable to the side walls of the shaft so that the shelf can be pivoted up with its shelf plane in contact with the rear side of the shaft, alternatively be removed forwards. The cassette is as a unit fastened to the frame 1 of the  
10 paper dispensing machine with key hole like holes and corresponding suspending means in the frame so that the shaft easily can be detached for paper loading. Alternatively paper can be loaded into the machine with a cassette in place. The paper has the shape of an elongate web with a width corresponding to the inner dimension of the paper cassette. The paper web has been folded with a distance between the folds that corresponds to the depth of the  
15 cassette, that is from the rear wall to the front wall and the paper web is folded in sick sack. The paper bundle that is to be mounted in the cassette is entered into the lower forwards open part of this and is lifted past the shelf that is then allowed to pivot out so that the paper bundle can lie on the shelf.

The upper part of the paper cassette that is the part with flanges folded inwards on the  
20 front side has such a height that several paper packs or bundles can be kept on top of each other and these are brought into the cassette one after another, at which the lower part of an upper pack is joined to the upper end of the closest lower pack so that later at the feeding of the paper the feeding can continue entirely continuous despite the change of pack. In this way it is possible to fill the cassette even if not all the paper has been used and without need  
25 for throwing away the remaining amount that remains of an upper pack.

The joining of the packs can be achieved in different ways, as for instance with self-adhering tape, adhering layers on the end flaps of the packs or by punching together with a simple and in the paper dispensing machine kept tool.

In the upper end the paper web (of folded paper) runs between two rollers of which the  
30 forward one can be brought forward in order to facilitate the threading of the paper web, which if one fills regularly practically never has to occur due to the joining. The paper web then runs down on the rear side of the cassette between this and the frame down to the feeding device 3 placed in the lower end of the automatic machine. Since the cassette for paper is removable there is no greater problems with putting the paper web between the

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cassette and the frame even if the slot is comparably narrow. Furthermore the paper behind the cassette is available through a vertical slot 9 in the back of the cassette.

The feeding device includes a front 10 and a rear 11 guide panel that upwards and downwards are angled away from each other. In this way a slightly ditch like shape is formed in the upper end of the panels and it is easy to push down the front end of the paper web between the panels. On the rear side of the feeding device a feeding roller is arranged driven by a motor 13 mounted at the side. On the roller a number of O-rings 14 are mounted at a distance from each other. The roller is arranged close behind the rear panel and the rings extend through openings 15 in the panel precisely to the front panel 10. When the driving roller with O-rings is brought to rotate the paper is drawn downwards by the O-rings simultaneously as it glides against the front guide panel.

The feeding device perforates or cuts partly the paper so that the size of the fed paper corresponds to the need, that is different lengths are cut dependent on if it is a question of toilet paper, wet wipe or towel that is to be delivered. The roller with O-rings thus advances different lengths of the paper web. Since the paper web by the O-ring are pressed against the front panel the folding of the paper web is partly smoothed. The front panel is arranged springingly in relation to the roller, which facilitates the initial inserting of the paper web, as well as the passage of the paper joints, between the O-rings and the front guide panel.

When a desired amount of paper has been advanced out a knife 16 arranged perpendicular to the plane of the handle is used to perforate the paper. The knife is provided with a number of tips arranged a short distance from each other and in the front panel as well as in the rear corresponding slots 17, 18 are arranged to allow the tips of the knife to pass therethrough. Since a small distance exists between the tips of the knife respectively the openings for these small bridges will remain at which possibly somewhat sturdier bridges may be arranged at the edges of the paper. The knife is pushed in by means of a motor 19 and an excenter device 20.

At the cutting of a paper with a knife the paper is held fast not only by the unmoving driving roller with its O-rings but in addition a springing 21 holder 22 is arranged on the knife supporting device, the holder 22, before the tips of the knives is driven into the paper, extends with a number of protrusions 23 through holes 24 in the front guide panel 10 and press the paper against the rear guide panel 11 so that the paper effectively is held during the perforating. If so is desired corresponding protrusions and holes in the front panel 10 may be arranged above the working area of the driving roller so that the holding above the knives need not only be by means of the O-rings of the driving roller.

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The two guide panels 10, 11 are in their lower ends as has been mentioned angled out from each other so that a slightly roof like look is achieved which in the ends is closed with sides. On the rear side of the rear guide panel 11 three tubes 25 are arranged. These are provided with nozzles or corresponding openings facing perpendicular to the panel and located behind vertical slots 26 in the panel 11.

The dispensing device for paper is connected to a water-main by a pressure reducing valve and via an electrically controlled valve the water can with reduced pressure be feed to one of the tubes for a controlled spraying of the paper with water only. Through the pressure reduction the water is prevented from damaging the paper and a supply of water adapted to the feeding speed of the paper can be achieved so that the desired degree of wettening of the paper is achieved. The ejection or rather spraying with water (or other liquid) does not begin until the paper has begun to be fed forward so that this has come down to the nozzle area so that it will only be the paper that is wetted, and likewise the spraying is stopped before the paper is stopped and cut, this so that it does not come to much water in the final stage, which could weaken the paper so that it instead is torn there instead of at the perforation. This can also be counter acted by the nozzles not being placed too tightly since this leaves intermediate more dry and thus stronger intermediate areas, which can facilitate the tearing.

For the adding of soap or rather a mixture of soap and water to one of the tubes a pump is arranged that draws soap from the corresponding container and pumps the soap into the conduit to the tube from the reduction valve via an electrically controlled valve (alternatively directly to separate nozzles so that the mixing takes place on the paper). The pump is preferably of the type were rollers in contact with a circular piece of a flexible tube or hose is brought to rotate. These pumps provide a very good dosage ability and also function as efficient valves. By stopping the soap dosage motor before the water feed is stopped the last water will flush the tube clean, which drastically reduce the risk of nozzles clogged by soap and if a drop should come from some of the nozzles after the intended spraying it will be pure water dripping.

The adding of disinfecting chemicals takes place in the same way as above has been described for soap. Since the mixing becomes efficient and the mixing relationship can be controlled exactly the overdosing that otherwise normally take place while washing ones hands can be eliminated.

When the paper has been punched respectably sprayed it can easily be torn along the perforation since the connecting bridges are small and thin, without risk of the paper being torn were it has been sprayed with water.

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The containers for disinfecting means and soap respectively are each on their upper side provided with a connection for the mounting of a refill container that is mounted upside down with a perforating of an outlet membrane of the refill container by means of an obliquely cut tube 27, so that the refill container with the soap or disinfecting chemicals successively can fill the ordinary container, that thus never need risk to become empty.

Instead of using buttons on the front side of the machine for the different paper ordering one can consider to use contact free sensors in order further to improve the hygiene. One can also consider to have contact free sensors for certain paper dispensing requirements and buttons for others.

For the fabrication of the folded paper stacks one can in accordance with invention use a device in accordance with Fig. 6, provided with two creasing rollers 31, 32. The creasing rollers are each provided with a protruding edge or blunt knife 33 and a 180° opposite pad 34, these rollers being brought to rotate with a shift or relation relative each other of 180° so that alternately one edge make a fold in one direction when pressuring the paper into the opposed pad and after half a turn then an opposed fold so that the paper by itself forms a sick sack folded stack. Half of the circumference of the rollers corresponds to the depth of the folded paper stack.

The above described device for the dispensing of paper is within the frame of the invented thought adaptable to other needs at other places of use, respectively markets segments as for instance hospitals, schools, day care centres, food shops, food industry, restaurants, fast food restaurants, collective transports, petrol stations, work shops, industries, offices, home environment, laboratories, busses, maintains vehicles, petrol stations, homes, schools etc. At this it can be provided with a greater or smaller number of containers with liquids that can be sprayed on the paper according to the requirement. In addition to water, soap and spirit perfumed water, degreasing agents, skin cream, washing up liquid, distilled water, desinfective agents etc can be sprayed on the dispensed paper. Spraying can take place in different degrees and in different combinations. For instance perfumed water can sprayed intermittently for a good distribution and mixing respectively or locally on a part of a paper. Furthermore the paper size can be varied depending on requirement and desires. Also a number of different choices in one and the same device can be varied between different devices and also be changed when so is desired. The adaptation of different spraying varieties as well as the cutting of differently large pieces of paper in the same device as well as different devices may at this take place by software at the programming or even reprogramming of the device. The invention thus allows a saving of

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space and installations on many places and for many different objects at the same time as the hygiene can be improved and the maintenance need and the paper waste can be reduced drastically.

5 By only spraying water intermittently it is possible to vary the degree of moisturising of the paper, for instance if one only want a moistening napkin in hot weather. With the same purpose also the feeding speed of the paper can be varied.

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